D H E C
PROMOTE PROTECT PROSPER
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TO: John T. Litton, P.E., Director
Division of Waste Management
Bureau of Land and Waste Management

FROM: David Scaturo, P.E., P.G., Manager
Corrective Action Engineering Section

DATE: September 5, 2003

RE: Evaluation of U.S. Marine Corps Recruit Depot Status Under
The RCRA Info Corrective Action Environmental Indicator
Event Codes (CA725 and CA750)
EPA ID No. SC6 170 022 762

CC: Donald Hargrove, RCRA Hydrogeology Section
Caron Falconer, EPA Region 4
Narindar Kumar, EPA Region 4
Tim Harrington, MCRD Parris Island
Art Sanford, Naval Facilities Engineering Command Southern Division

I. PURPOSE OF MEMO

This memo is written to formalize an evaluation of the status of Marine Corps Recruit Depot (MCRD) in relation to the following corrective action event codes defined in the Resource Conservation and Recovery Act Information System (RCRA Info):

1.) Current Human Exposures Under Control (CA725),

2.) Migration of Contaminated Groundwater Under Control (CA750).

Concurrence by the Director of the Division of Waste Management is required prior to entering these event codes into RCRA Info. Your concurrence with the interpretations provided in the following paragraphs and the subsequent recommendations is satisfied by dating and signing at the appropriate location within Attachments 1 and 2.

II. HISTORY OF ENVIRONMENTAL INDICATOR EVALUATIONS AT THE FACILITY AND REFERENCE DOCUMENTS

This particular evaluation is the second evaluation for MCRD. The earlier evaluation was dated September 29, 1998, and is attached. The results of this earlier evaluation recommended that CA725 NO and CA750 NO be entered into RCRA Info (then RCRIS) due to the fact that human exposures to contamination were not currently controlled for soil, groundwater, and surface water, and also due the uncontrolled migration of contaminated groundwater at the facility.

The results of this evaluation are based on information obtained from the following documents:

1. Naval Energy and Environmental Support Activity (NEESA). September 1986. Initial Assessment Study of MCRD Parris Island, SC. NEESA 13-095.

2. Feasibility Study/Corrective Measures Study for Site 12/SWMU 10, MCRD Parris Island, SC. April 9, 2002. Tetra Tech NUS, Inc.

3. Interim Remedial Action/Corrective Action Report Site/SWMU 3 Causeway Landfill. June 2002. CH2M Hill.

4. Draft Remedial Investigation/RCRA Facilities Investigation for Site/SWMU 45 Former MWR Dry Cleaning Facility, MCRD Parris Island, SC. July 1, 2002. Tetra Tech NUS, Inc.

5. Site Inspection and Confirmatory Sampling Report for Site/SWMU 4, Site/SWMU 5, Site/SWMU 7, Site 9/SWMU 8, Site 13C/SWMU 13, Site/SWMU 16, SWMU 27, and SWMU 35, MCRD Parris Island, SC. July 29, 2002. Tetra Tech NUS, Inc.

6. Final Remedial Action/Corrective Action Work Plan for Site/SWMU 1 Incinerator Landfill and SWMU 41 Former Incinerator, MCRD Parris Island, SC. June 16, 2003. ECC and Law Engineering and Environmental Services, Inc.

III. FACILITY SUMMARY

MCRD is located approximately one (1) mile south of Port Royal city limits and approximately three (3) miles south of Beaufort, in the southeastern corner of South Carolina. MCRD consists of 8047 acres, of which 3274 acres are dry land, 4344 acres are salt marsh, and 429 acres are saltwater creeks and ponds. The dry land consists of several islands, the largest of which is Parris Island. Most of MCRD's training, administration, housing, and resource management facilities are located on Parris Island. MCRD is situated on relatively flat land, with elevations ranging from zero (0) to twenty-two (22) feet above mean sea level (msl), and averaging four (4) feet above msl. During extremely high tides, low-lying areas are covered by salt water.

The mission of MCRD is to provide for the reception and recruit training of enlisted personnel upon their initial entry into the Marine Corps; to provide field and combat skills training for recruits; to provide schools to train enlisted Marines as drill instructors and field staff, to conduct rifle marksmanship training for Marine officers and enlisted personnel in the southeastern United States and for other personnel as requested; and to conduct training for Marine Reserves.

The MCRD currently has identified 52 Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs), including 2 landfills and 1 regulated unit that was clean closed in August 1997. EPA placed MCRD on the NPL in January 1995. All corrective action at the site is performed in accordance with both CERCLA and RCRA requirements. A Federal Facilities Agreement (FFA) is currently being negotiated between EPA Region 4, the State of South Carolina, and the Navy.

IV. CONCLUSION FOR CA725

As outlined in Attachment 1, there are currently no complete human health exposure pathways to contamination at the MCRD. This conclusion is based on current conditions and data, and is summarized for soil, sediment, groundwater, surface water, and air media below.

Soil and Sediment

Soil and sediments have been impacted in the past by contamination from SWMUs at MCRD. At the two landfills (SWMUs 1/41 and 3), exposure to this contamination has been controlled in some cases by Interim Measures performed by the facility and currently there is no known threat to human health. At the Jericho Island disposal site (SWMU 10), soil and sediment contamination is at or slightly exceeds industrial screening values. Based on the remote location of this site and the current infrequent presence of personnel, human exposure is for all purposes controlled. In addition to this, a Human Health Risk Assessment (HHRA) concluded that there were no unacceptable risks to construction workers, adolescent trespassers, adult or adolescent recreational users at this site. The HHRA concluded that the only unacceptable risks were to on-site child and adult residents, which is inconsistent with the current and future land use. At the former dry cleaner site (SWMU 45), a HHRA concluded that there were no unacceptable risks to current maintenance workers, commercial workers, or adult visitors from contaminated soils in this area. At SWMUs 4, 5, 7, 8, 13, 16, 27, and 35, very few contaminants exceeded industrial screening levels, and those that did exceed screening levels did so only slightly. Based on the current industrial land use of the areas associated with these SWMUs, there is no known threat to human health.

Groundwater

While groundwater is contaminated at SWMU 45 (former dry cleaner), the groundwater currently is not being used as a drinking water source or as an irrigation source for crops, fruits, or vegetables at the Base or at surrounding properties, and therefore does not pose a threat to human health. A HHRA performed at SWMU 45 concluded that there were unacceptable risks to current maintenance workers, commercial workers, or adult visitors from exposure to contaminated groundwater at this site. However, the facility has land use controls in place, which require digging permits and approval from the facility environmental office prior to land disturbance at this site.

Surface Water

Surface water has been sampled in the vicinity of several SWMUs where contaminated groundwater was suspected to exist or, if present, could potentially be contributing to surface water in the marsh. Sampling results have not shown contamination above relevant human health action levels.

Air

Releases to air from soil, groundwater, sediments, and/or surface water contaminated by SWMUs or AOCs at MCRD are not known to have occurred or be occurring above relevant action levels.

Based on the information provided above, it is recommended that CA725 YE be entered into RCRA Info for the MCRD.

V. CONCLUSION FOR CA750

As outlined in Attachment 2, groundwater is contaminated at SWMU 45 (former dry cleaner) on MCRD. Specifically, groundwater is contaminated with VOCs at this SWMU. Based on the above information, it is recommended that CA750 NO remain in RCRA Info for the MCRD.

VI. SUMMARY OF FOLLOW-UP ACTIONS (Discussion of What is Needed to Get to Yes, with EI Interim Milestone Schedule)

A. CA750 – SWMU 45 has had groundwater extraction system implemented as Interim Measure in the past. In addition to this, in situ chemical oxidation was performed at SWMU 45 as an Interim Measure in the past. But based on the latest data sampled after the in situ chemical oxidation, the VOC plume at this site has migrated to monitoring wells that were clean in the past, and has increased in concentration at other wells.

Marine Corps Recruit Depot EI Interim Milestone Schedule CA750			
Activity	**CA RCRA Info Event Code**	**Scheduled Date (Qtr&FY)**	**Remarks**
RFI Addendum Approved	CA200	1/31/04	SWMU 45: redefine nature & extent
IMWP Approved	CA630	4/30/04	SWMU 45: redesign pump & treat system
IM Rept. Approved	CA645	8/31/04	SWMU 45: restart pump & treat system

VII. LEVEL OF CONFIDENCE IN REACHING A POSITIVE EI EVALUATION AND MAJOR ISSUES

The Department feels reasonably confident that the facility can achieve a CA750 YE determination in 2004, provided that funding is obtained by the Navy to concentrate on determining the current extent of contamination and implements an Interim Measure to control the migration of contaminated groundwater at this site.

ATTACHMENT 1
DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
RCRA Corrective Action
Environmental Indicator (EI) RCRA Info Code (CA725)
Current Human Exposures Under Control

Facility Name: US Marine Corps Recruit Depot
Facility Address: P.O. Box 19003, Beaufort, SC 29905-9003
Facility EPA ID #: SC6 170 022 762

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

X If yes - check here and continue with #2 below,

____ If no - re-evaluate existing data, or

____ If data are not available skip to #6 and enter"IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Current Human Exposures Under Control" EI

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRA INFO national database ONLY as long as they remain true (i.e., RCRA INFO status codes must be changed when the regulatory authorities become aware of contrary information).

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **"contaminated"**[1] above appropriately protective risk-based "levels" (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

Media	Yes	No	?	Rationale/Key Contaminants
Groundwater	X			VOCs, Inorganics
Air (indoors)[2]		X		
Surface Soil (e.g., <2 ft)	X			VOCs, SVOCs, Inorganics
Surface Water		X		
Sediment	X			Inorganics, Pesticides, PCBs
Subsurface Soil (e.g., >2 ft)	X			Landfills/Unknown
Air (outdoors)		X		

____ If no (for all media) - skip to #6, and enter "YE," status code after providing or citing appropriate "levels," and referencing sufficient supporting documentation demonstrating that these "levels" are not exceeded.

__X__ If yes (for any media) - continue after identifying key contaminants in each "contaminated" medium, citing appropriate "levels" (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

____ If unknown (for any media) - skip to #6 and enter "IN" status code.

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1 "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based "levels" (for the media, that identify risks within the acceptable risk range).

2 Recent evidence (from Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above [and adjacent to] groundwater with volatile contaminants) does not present unacceptable risks.

Rationale and Reference(s):_Contaminated surface and subsurface soils at SWMUs 1/41, 3, 4,5,7,8,13,16,27,35,10, and 45. Contaminated groundwater at SWMU 45. References are located on last page of this attachment.

3. Are there **complete pathways** between "contamination" and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

Summary Exposure Pathway Evaluation Table
Potential **Human Receptors** (Under Current Conditions)

"Contaminated" Media	**Residents**	**Workers**	**Day-Care**	**Construction**	**Trespassers**	**Recreation**	**Food[3]**
Groundwater	No	No	No	No	N/L	N/L	No
Air (indoors)	No	No	No	N/L	N/L	N/L	N/L
Soil (surface, e.g., <2 ft)	No	No	No	No	No	No	No
Surface Water	No	No	N/L	N/L	No	No	No
Sediment	No	No	N/L	N/L	No	No	No
Soil (subsurface, e.g., >2 ft)	No	No	N/L	No	N/L	N/L	No
Air (outdoors)	No	No	No	No	No	N/L	N/L

Instructions for Summary Exposure Pathway Evaluation Table:

1. For Media which are not "contaminated" as identified in #2, please strike-out specific Media, including Human Receptors' spaces, or enter "N/C" for not contaminated.

2. Enter "yes" or "no" for potential "completeness" under each "Contaminated" Media -- Human Receptor combination (Pathway).

[3] Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

Note: In order to focus the evaluation to the most probable combinations, some potential "Contaminated" Media - Human Receptor combinations (Pathways) are not assigned spaces in the above table (i.e, **N/L - not likely**). While these combinations may not be probable in most situations, they may be possible in some settings and **should be added as necessary**.

_X_ If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).

____ If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.

____ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code

Rationale and Reference(s):_SWMU 3 landfill is capped; SWMU 1/41 landfill is in the process of being capped. Based on the 2002 Confirmatory Sampling, only very few, minor exceedences above industrial screening levels were found at SWMUs 4,5,7,8,13,16,27,35 and these sites are in industrial or remote settings. Minor exceedences of industrial screening levels were found at SWMU 10 but it is in a very remote location. Groundwater is not being used at this facility for drinking water or irrigation of crops or fruits/vegetables. Dig permit required prior to disturbance at all SWMUs. See last page of attachment for references.

4 Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **"significant"**[4] (i.e., potentially "unacceptable" because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable "levels" (used to identify the "contamination"); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable "levels") could result in greater than acceptable risks)?

____ If no (exposures can not be reasonably expected to be significant (i.e., potentially "unacceptable") for any complete exposure pathway) - skip to #6 and enter "YE" status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

____ If yes (exposures could be reasonably expected to be "significant" (i.e., potentially "unacceptable") for any complete exposure pathway) - continue after providing a description (of each potentially "unacceptable" exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to "contamination" (identified in #3) are not expected to be "significant."

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[4] If there is any question on whether the identified exposures are "significant" (i.e., potentially "unacceptable") consult a human health Risk Assessment specialist with appropriate education, training and experience.

____ If unknown (for any complete pathway) - skip to #6 and enter "IN" status code

Rationale and Reference(s):_____

5 Can the "significant" **exposures** (identified in #4) be shown to be within **acceptable** limits?

____ If yes (all "significant" exposures have been shown to be within acceptable limits) - continue and enter "YE" after summarizing and referencing documentation justifying why all "significant" exposures to "contamination" are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

____ If no (there are current exposures that can be reasonably expected to be "unacceptable")- continue and enter "NO" status code after providing a description of each potentially "unacceptable" exposure.

____ If unknown (for any potentially "unacceptable" exposure) - continue and enter "IN" status code

Rationale and Reference(s):_____

6. Check the appropriate RCRA INFO status codes for the Current Human Exposures Under Control EI event code (CA725), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (and attach appropriate supporting documentation as well as a map of the facility):

__X__ YE - Yes, "Current Human Exposures Under Control" has been verified. Based on a review of the information contained in this EI Determination, "Current Human Exposures" are expected to be "Under Control" at the Marine Corps Recruit Depot facility, EPA ID **#SC6 170 022 762**, located at P.O. Box 19003, Beaufort, SC 29905-9003 under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

____ NO - "Current Human Exposures" are NOT "Under Control."

____ IN - More information is needed to make a determination.

Completed by(signature) David Scaturo Date 9-5-03
(print) David Scaturo, P.E., P.G.
(title) Manager, Corrective Action Engineering Section

Supervisor (signature) John Litton Date 9-9-03 [5]
(print) John Litton, P.E.
(title) Director, Division of Waste Management
(EPA Region or State) SCDHEC

Locations where References may be found:
_SCDHEC, BLWM, 8901 Farrow Rd., Suite 109, Columbia, SC 29210
_EPA Region 4, Atlanta Federal Center, 61 Forsyth St SW, Atlanta, GA 30303
_Beaufort County Public Library, 311 Scott St., Beaufort, SC 29902

[5] **FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.**

Contact telephone number and e-mail:
(name)_David Scaturo
(phone #)_803-896-4185
(e-mail)_scaturdm@dhec.sc.gov

References:

Interim Remedial Action/Corrective Action Report Site/SWMU 3 Causeway Landfill. CH2M Hill, June 2002.

Final Remedial Action/Corrective Action Work Plan Site/SWMU 1 Incinerator Landfill and SWMU 41 Former Incinerator, MCRD Parris Island, SC. ECC and Law Engineering, June 16, 2003.

Site Inspection and Confirmatory Sampling Report for Site/SWMU 4, Site/SWMU 5, Site/SWMU 7, Site 9/SWMU 8, Site 13C/SWMU 13, Site/SWMU 16, SWMU 27, and SWMU 35. MCRD Parris Island, SC. Tetra Tech NUS, Inc. July 29, 2002.

Feasibility Study/Corrective Measures Study for Site 12/SWMU 10, MCRD Parris Island, SC. Tetra Tech NUS, Inc. April 9, 2002.

Draft Remedial Investigation/RCRA Facilities Investigation for Site/SWMU 45 Former MWR Dry Cleaning Facility, MCRD Parris Island, SC. Tetra Tech NUS, Inc. July 1, 2002.

ATTACHMENT 2
DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION
RCRA Corrective Action
Environmental Indicator (EI) RCRA Info Event Code (CA750)
Migration of Contaminated Groundwater Under Control

Facility Name: __Marine Corps Recruit Depot_____
Facility Address: __P.O. Box 19003 Beaufort, SC 29905-9003_____
Facility EPA ID #:__SC6 170 022 762_____

1. Has **all** available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

   __X__ If yes - check here and continue with #2 below,

   _____ If no - re-evaluate existing data, or

   _____ If data are not available, skip to #8 and enter"IN" (more information needed) status code.

BACKGROUND

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRA INFO national database ONLY as long as they remain true (i.e., RCRA INFO status codes must be changed when the regulatory authorities become aware of contrary information).

2. Is **groundwater** known or reasonably suspected to be **"contaminated"**[6] above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

   __X__ If yes - continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

   ____ If no - skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

   ____ If unknown - skip to #8 and enter "IN" status code.

   Rationale and Reference(s):_PCE, TCE and their daughter products, Benzene, Metals. See last page of attachment for references._____

6 "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

3. Has the **migration** of contaminated groundwater **stabilized** such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"[7] as defined by the monitoring locations designated at the time of this determination?

____ If yes - continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"[7]).

_X_ If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"[7]) - skip to #8 and enter "NO" status code, after providing an explanation.

____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):_____

[7] "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

4. Does "contaminated" groundwater **discharge** into **surface water** bodies?

_____ If yes - continue after identifying potentially affected surface water bodies.

_____ If no - skip to #7 (and enter a "YE" status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater "contamination" does not enter surface water bodies.

_____ If unknown - skip to #8 and enter "IN" status code.

Rationale and Reference(s):_____

5. Is the **discharge** of "contaminated" groundwater into surface water likely to be **"insignificant"** (i.e., the maximum concentration[8] of each contaminant discharging into surface water is less than 10 times their appropriate groundwater "level," and there are no other conditions (e.g., the nature and number of discharging contaminants, or environmental setting) which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

_____ If yes - skip to #7 (and enter "YE" status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration[8] of key contaminants discharged above their groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) providing a statement of professional judgment/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts to the receiving surface water, sediments, or eco-system.

_____ If no - (the discharge of "contaminated" groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration[8] of <u>each</u> contaminant discharged above its groundwater "level," the value of the appropriate "level(s)," and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations[8] greater than 100 times their appropriate groundwater "levels," providing the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the determination), and identifying if there is evidence that the amount of discharging contaminants is increasing.

_____ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):_____

6. Can the **discharge** of "contaminated" groundwater into surface water be shown to be "**currently acceptable**" (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented[9])?

_____ If yes - continue after either: 1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site's surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater; OR
2) providing or referencing an interim-assessment,[10] appropriate to the potential for impact,

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8 As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

9 Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

10 The understanding of the impacts of contaminated groundwater discharges into surface water

that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment "levels," as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

_____ If no - (the discharge of "contaminated" groundwater can not be shown to be **"currently acceptable"**) - skip to #8 and enter "NO" status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

_____ If unknown - skip to 8 and enter "IN" status code.

Rationale and Reference(s):_____

bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

7. Will groundwater **monitoring** / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the "existing area of contaminated groundwater?"

_____ If yes - continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the "existing area of groundwater contamination."

_____ If no - enter "NO" status code in #8.

_____ If unknown - enter "IN" status code in #8.

Rationale and Reference(s):_____

8. Check the appropriate RCRA INFO status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

____ YE - Yes, "Migration of Contaminated Groundwater Under Control" has been verified. Based on a review of the information contained in this EI determination, it has been determined that the "Migration of Contaminated Groundwater" is "Under Control". Specifically, this determination indicates that the migration of "contaminated" groundwater is under control, and that monitoring will be conducted to confirm that contaminated groundwater remains within the "existing area of contaminated groundwater" This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

__X__ NO -. Unacceptable migration of contaminated groundwater is observed or expected.

____ IN - More information is needed to make a determination.

Completed by(signature) David Scaturo Date 9-5-03
(print) David Scaturo, P.E., P.G.
(title) Manager, Corrective Action Engineering Section

Supervisor (signature) John Litton Date 9-9-03
(print) John Litton, P.E.
(title) Director, Division of Waste Management
(EPA Region or State) SCDHEC

Locations where References may be found:

_SCDHEC, BLWM, 8901 Farrow Rd., Suite 109, Columbia, SC 29210
_EPA Region 4, Atlanta Federal Center, 61 Forsyth St SW, Atlanta, GA 30303
_Beaufort County Public Library, 311 Scott St., Beaufort, SC 29902

Contact telephone and e-mail numbers:

(name)_David Scaturo
(phone #)_803-896-4185
(e-mail)_scaturdm@dhec.sc.gov

References:

Draft Remedial Investigation/RCRA Facilities Investigation for Site/SWMU 45 Former MWR Dry Cleaning Facility, MCRD Parris Island, SC. Tetra Tech NUS, Inc. July 1, 2002.

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SEP 2 9 1998

4WD-RCRA

SUBJ: Evaluation of U.S. Marine Corps Recruit Depot's Status under the RCRIS Corrective Action Environmental Indictor Event Codes (CA725 and CA750)
EPA I.D. No. SC6 170 022 762

FROM: Larry E. Fitchhorn. P.E. Larry Fitchhorn 9/21/98
Environmental Engineer

THRU: Caron Falconer, Chief CF 9/22
North Programs Section

THRU: Earl Bozeman, Chief Earl Boz
Department of Defense Remedial Section

TO: Jon D. Johnston, Chief Jon D. Johnston
Federal Facilities Branch

I. PURPOSE OF MEMO

This memo is written to formalize an evaluation of U.S. Marine Corps Recruit Depot's status in relation to the following corrective action event codes defined in the Resource Conservation and Recovery Information System (RCRIS):

1) Human Exposures Controlled Determination (CA725)

2) Groundwater Releases Controlled Determination (CA750).

Concurrence by the Federal Facilities Branch Chief is required prior to entering these event codes into RCRIS. Your concurrence with the interpretations provided in the following paragraphs and the subsequent recommendations is satisfied by dating and signing above. See Memo Attachment 1 for more specific information about the RCRIS definitions for CA725 and CA750.

II. HISTORY OF ENVIRONMENTAL INDICATOR EVALUATIONS AT THE FACILITY AND REFERENCE DOCUMENTS

This particular evaluation is the first evaluation performed by EPA for U.S. Marine Corps Recruit Depot (MCRD), Parris Island, South Carolina. The evaluation, and associated interpretations and conclusions on contamination, exposures and contaminant migration at the facility, are based on information obtained from the following documents:

1. Initial Assessment Study (IAS)
Marine Corps Recruit Depot
Parris Island, South Carolina
September 1986

2. RCRA Facility Assessment (RFA) Report
U.S. Marine Corps Recruit Depot
Parris Island, South Carolina
April 1990

3. Remedial Investigation
Final Report
Marine Corps Recruit Depot
Verification Step
Parris Island, South Carolina
May 1990

4. Extended Site Inspection Report
Causeway Landfill
Marine Corps Recruit Depot
Parris Island, South Carolina
August 1992

5-7. Master Work Plan- Final
Volumes 1, 2 and 3
Marine Corp Recruit Depot
Parris Island, South Carolina
November 1990

III. FACILITY SUMMARY

MCRD is located approximately one (1) mile south of the Port Royal city limits and about three (3) miles south of Beaufort, in the southeastern corner of South Carolina. MCRD consists of 8047 acres, of which 3274 acres are dry land, 4344 acres are salt marsh, and 429 acres are saltwater creeks and ponds. The dry land consists of several islands, the largest of which is Parris Island. Most of the Depot's training, administrative, housing and resource management facilities are located on Parris Island. MCRD is situated on relatively flat land, with elevations varying between zero (0) and twenty-two (22) feet above mean sea level (msl), and averaging four (4) feet above msl. During extremely high tides, low-lying areas are covered by salt water.

The mission of MCRD is to provide for the reception and recruit training of enlisted personnel upon their initial entry into the Marine Corps; to provide field and combat skills training for recruits; to provide schools to train enlisted Marines as drill instructors and field staff; to conduct

rifle marksmanship training for Marine officers and enlisted personnel in the southeastern United States and for personnel of other services as requested; and to conduct training for Marine reserves.

Present waste management practices consist of managing the following: waste oil; rags contaminated with solvents, thinners, oils and fuels; paint wastes; unrinsed pesticides containers; and soil contaminated with No. 6 fuel oil. These wastes are contained in drums located at satellite accumulation areas (SAAs) prior to transfer to the Hazardous Waste Storage Building (SWMU 36) and then offsite. Scrap metal, appliances, tires, batteries, empty bullet shells, and other surplus/salvage items are stored at the Defense Reutilization and Marketing Office (DRMO) Salvage Yard (SWMU 35). Two (2) active landfills are maintained at MCRD. The Inert Disposal Area A (SWMU 11) receives cellulosic construction rubble. The Inert Disposal Area C (SWMU 13) receives marine spoils from the facility waterways. Inert Disposal Area B (SWMU 12) was used from 1976 to 1979 to receive cellulosic rubble.

Wastes generated by shops and support services at MCRD include waste oil; liquid and solid paint wastes; perchloroethylene still bottoms; rags soaked with oils and solvents (naphtha); domestic refuse; domestic sewage; construction debris; weapon cleaning rags; mercury amalgam; beryllium waste; PCB oils; and scrap metal.

Past waste management practices included disposal of wastes directly onto soil. The Pesticide Rinsate Disposal Area (SWMU 16) received pesticide rinsate containing DDT. Paint wastes were disposed directly on the soil at the Former Paint Shop Disposal Area (SWMU 5). The Paint Waste Storage Area (SWMU 8) was an unlined storage area that received frequent spillage of paint thinners and other liquid paint wastes. MCRD fire training activities used to be conducted at an unlined area in the northeast section of the facility. This unit is known as the Dredge Spoils Area Fire Training Pit (SWMU 4). Fire training is at present conducted at the Marine Corps Air Station in Port Royal.

MCRD has never been issued a RCRA permit, and there appears to be no likelihood of one being issued in the future, as the facility has successfully withdrawn its RCRA permit application for hazardous waste storage. EPA placed MCRD on the NPL in January 1995. The Marine Corps has decided that installation restoration work at MCRD will encompass both CERCLA and RCRA requirements.

IV. CONCLUSIONS AND STATUS CODE RECOMMENDATION FOR CA725

Based on the media-by-media evaluation presented in Memo Attachment 2, the assumption has been made that previously documented groundwater contamination at MCRD still exists. The finding has been made that, at this time, there is plausible risk of human exposure to contaminated ground water via migration into surrounding surface water bodies.

Because human exposures are deemed not currently controlled for contaminated ground water, it is recommended that CA725 NO be entered into RCRIS.

V. CONCLUSIONS AND STATUS CODE RECOMMENDATION FOR CA750

Based on data contained in the documents referenced in Memo Attachment 2 and summarized in the groundwater portion of the same attachment, releases from SWMUs and/or AOCs have contaminated the ground water at concentrations above relevant action levels.

Although the ground water is contaminated above relevant action levels, control measures have not been implemented. Nevertheless, they are deemed necessary at the present time. Because not all groundwater contamination at the facility is controlled, it is recommended that CA750 NO be entered into RCRIS.

VI. SUMMARY OF FOLLOW-UP ACTIONS

In view of the absence of post-1990 sampling data for soil and ground water, it is not known what the current state of environmental media contamination is at this time. At present, follow-up action is contemplated in the investigation of environmental media proposed in the Final Master Work Plan. The specific remedies to be pursued will be dependent upon the results of this investigation. The Final Master Work Plan was approved in June 1998. The remedial investigation commenced in May 1998 and field work is scheduled to be completed in September 1998. The facility has implemented an interim action at SWMU 45, the dry cleaner spill site. The facility has also installed a groundwater pump and treat system which has treated over 200,000 gallons of groundwater to date.

MEMO ATTACHMENT 1

A. HUMAN EXPOSURES CONTROLLED DETERMINATION (CA725)

There are five (5) national status codes under CA725. These status codes are:

1) YE Yes, applicable as of this date (i.e., human exposures are controlled as of this date).

2) NA Previous determination no longer applicable as of this date.

3) NC No control measures necessary.

4) NO Facility does not meet definition (i.e., human exposures are not controlled as of this date).

5) IN More information is needed.

The first three (3) status codes listed above were defined in the January 1995 Data Element Dictionary for RCRIS. The last two (2) status codes were defined in the June 1997 Data Element Dictionary.

Note that CA725 is designed to measure human exposures over the entire facility (i.e., the code does not track SWMU-specific actions or success). Every area at the facility must meet the definition before a YE or NC status code can be entered for CA725. The NO status code should be entered if there are current unacceptable risks to humans due to releases of hazardous wastes or hazardous constituents from any SWMU(s) or AOC(s). The IN status code is designed to cover those cases where insufficient information is available to make an informed decision on whether or not human exposures are controlled. If an evaluation determines that there are both unacceptable and uncontrolled current risks to humans at the facility (NO) along with insufficient information on contamination or exposures at the facility (IN), then the priority for the EI recommendation is the NO status code.

In the opinion of Region 4, the previous relevance of NA as a meaningful status code is eliminated by the June 1997 Data Element Dictionary's inclusion of NO and IN with the existing YE and NC status codes. In other words, YE, NC, NO and IN cover all of the scenarios possible in an evaluation or reevaluation of a facility for CA725. Therefore, it is the opinion of Region 4 that only YE, NC, NO and IN should be utilized to categorize a facility for CA725. No facility in Region 4 should carry a NA status code.

B. GROUNDWATER RELEASES CONTROLLED DETERMINATION (CA750)

There are five (5) status codes listed under CA750:

1) YE Yes, applicable as of this date (i.e., groundwater releases are controlled as of this date).

2) NA Previous determination no longer applicable as of this date.

3) NR No releases to groundwater.

4) NO Facility does not meet definition (i.e., groundwater releases are not controlled as of this date).

5) IN More information is needed.

The first three (3) status codes listed above were defined in January 1995 Data Element Dictionary for RCRIS. The last two (2) status codes were defined in June 1997 Data Element Dictionary.

The status codes for CA750 are designed to measure the adequacy of actively (e.g., pump and treat) or passively (e.g., natural attenuation) controlling the physical movement of ground water contaminated with hazardous constituents above relevant action levels. The designated boundary (e.g., the facility boundary, a line upgradient of receptors, the leading edge of the plume as defined by levels above action levels or cleanup standards, etc.) is the point where the success or failure of controlling the migration of hazardous constituents is measured for active control systems. Every contaminated area at the facility must be evaluated and found to have the migration of contaminated ground water controlled before a "YE" status code can be entered.

If contaminated ground water is not controlled in any area(s) of the facility, the NO status code should be entered. If there is not enough information at certain areas to make an informed decision as to whether groundwater releases are controlled, then the IN status code should be entered. If an evaluation determines that there are both uncontrolled groundwater releases for certain units/areas (NO) and insufficient information at certain units/areas of groundwater contamination (IN), then the priority for the EI recommendation should be the NO status code.

In the opinion of Region 4, the previous relevance of NA as a meaningful status code is

eliminated by the June 1997 Data Element Dictionary's inclusion of NO and IN with the existing YE and NR status codes. In other words, YE, NR, NO and IN cover all of the scenarios possible in an evaluation or reevaluation of a facility for CA750. Therefore, it is the opinion of Region 4 that only YE, NR, NO and IN should be utilized to categorize a facility for CA750. No facility in Region 4 should carry a NA status code.

MEMO ATTACHMENT 2

MEDIA-BY-MEDIA DISCUSSION OF CONTAMINATION AND THE STATUS OF PLAUSIBLE HUMAN EXPOSURES

Because assumptions have to be made as to whether or not human exposures to current media contamination are plausible and, if plausible, whether or not controls are in place to address these plausible exposures, this memo attachment examines each environmental medium (i.e., soil, ground water, surface water, air) at the entire facility (including any offsite contamination emanating from the facility) rather than from individual areas or releases. As a result of this independent media-by-media examination, conclusions were reached and a final recommendation was made as to the proper CA725 status code for MCRD. The conclusions and recommendation are presented in Section IV of the Environmental Indicator (EI) memo.

It was then necessary to evaluate MCRD for its CA750 status. Please note that CA750 is based on adequate control of all contaminated ground water at the facility. The conclusions and ultimate recommendation as to the appropriate CA750 status code for MCRD were derived from the groundwater section of the media-by-media examination found in this attachment, and are presented in Section V of the EI memo.

The specific documents used in evaluating ground water at MCRD are listed below:

1. Initial Assessment Study (IAS)
   Marine Corps Recruit Depot
   Parris Island, South Carolina
   September 1986

2. RCRA Facility Assessment (RFA) Report
   U.S. Marine Corps Recruit Depot
   Parris Island, South Carolina
   April 1990

3. Remedial Investigation
   Final Report
   Marine Corps Recruit Depot
   Verification Step
   Parris Island, South Carolina
   May 1990

4. Extended Site Inspection Report
Causeway Landfill
Marine Corps Recruit Depot
Parris Island, South Carolina
August 1992

It should be noted that very little has been done in the way of environmental investigation, and nothing in terms of remediation of contamination. Other than a 1992 study of marine life in the vicinity of the Causeway Landfill (see Reference No. 4), no analytical data is available from more recently than 1990 (Reference Nos. 2 and 3). Thus, it is obviously not possible to state in this memo what the current situation at MCRD is in regard to contamination of the various environmental media. In view of the shallow water table underlying Parris Island, and of the dilution effects caused by tides and by nearby marshes, creeks and rivers, environmental contamination (or the lack thereof) identified in 1990 may not resemble the contamination existing in 1998. It is quite apparent that extensive investigation of environmental media is necessary. Such investigation is being planned, and the proposal is presented in Volume III of the MCRD Draft Final Master Work Plan (Reference No. 7). Once these investigations have been completed, additional information will be available for an informed decision to be made as to the appropriate remedial actions, if any, to be taken at MCRD.

Ground Water

MCRD is located on barrier-island sand, silt and clay deposits. Ground water beneath the facility consists of a surficial aquifer and the underlying Tertiary limestone aquifer. These two (2) units are separated by the impermeable Hawthorne formation, which consists of dense sandy clays approximately twenty (20) feet thick.

The water table of the surficial aquifer ranges from zero (0) to ten (10) feet below sea level, with an average depth of three (3) feet. This water table is strongly affected by tidal action and the resulting influence of the nearby tidal rivers and streams. The groundwater flow rate in the surficial aquifer averages between 0.1 and one (1) foot per day, with flow directed towards surface water bodies such as creeks, ponds and rivers. The surficial aquifer beneath MCRD is a poor potable water source due to salt water intrusion and high sulfur content resulting from decomposition of organic matter. As a consequence, the water in this aquifer is not used for any purpose. While there is potential for contamination of the surficial aquifer at MCRD, its shallow depth and geographic isolation from other land masses would most likely prevent contamination from migrating offsite to areas that use the surficial aquifer as a potable water source. Any contamination reaching this aquifer would instead be discharged to surrounding surface water bodies, potentially resulting in adverse impact to human health and the environment (e.g., the marine life in the surface water bodies and the people who fish in those waters).

The underlying Tertiary limestone aquifer is the principal water supply for south coastal South Carolina. However, below MCRD salt water intrusion has contaminated this deeper aquifer,

preventing it from being used as a water supply source for the Depot. The history of Tertiary limestone aquifer use at MCRD has been one of over-pumping, thereby artificially causing the saltwater contamination of the aquifer. The wells currently located at MCRD are employed for monitoring purposes but are not used for supplying water for potable or other uses. There appears to be little or no risk of surficial aquifer contamination penetrating into the underlying aquifer at MCRD. The Tertiary limestone aquifer is artesian and hydrologically separate from the overlying surficial aquifer. A confining layer separates the deep aquifer from the surficial aquifer and appears to prevent vertical mixing and the downward ,migration of contaminants to the deeper aquifer.

Data from 1990 indicate that releases from solid waste management units (SWMUs) and areas of concern (AOCs) have contaminated the surficial aquifer at concentrations above relevant action levels. The action levels of concern are either the tap water risk based concentrations (RBCs) or the maximum contaminant levels (MCLs). The contaminant constituents identified in the ground water, and their respective action levels, are presented in Table 1 below.

Table 1

Groundwater Contamination

Contaminant	Max Concen. ug/l	Tap Water RBC, ug/l	MCL, ug/l
1,2-dichloroethane	20	0.12	7
benzene	250	0.36	5
ethylbenzene	735	1300	700
chloroform	12	0.15	-
chromium	110	180	100
lead	73	-	15 *

* treatment technique action level

The ground water in the surficial aquifer has clearly been contaminated. Due to the lack of any data more recently obtained than eight (8) years ago, coupled with the tidal flushing of the aquifer, no definitive conclusions can be reached with regard to present-day contamination of this aquifer. However, in the absence of sampling data to the contrary, and in view of the fact that no remedial activities have taken place at MCRD, it is assumed that similar contamination still exists.

In addition to the observed groundwater contamination in the surficial aquifer, there are plausible human exposures to this contamination. While the surficial aquifer is not used as a source of drinking water at MCRD, and is recognized as being contaminated and unsuitable as a present or future water source, migration of aquifer contamination could readily occur, particularly into surrounding surface water bodies, which are used by many people for fishing.

Based on the above discussion and on the assumption that the state of contamination documented in 1990 exists today, plausible human exposures to groundwater contamination exist, are not controlled, and necessitate control measures. Active measures (such as a pump-and-treat system) could be implemented in an attempt to arrest the movement of contaminated ground water and eliminate it to the greatest extent practical. However, given the previously-discussed hydrology surrounding and underlying MCRD, the control measure most likely to eliminate groundwater contamination is the removal of contaminant sources (i.e., the wastes buried in pits and landfills).

Surface Water

Surface runoff from most of the working areas of MCRD flows into storm sewers that discharge into the marshes surrounding Parris Island. Surficial water bodies can be contaminated by SWMUs and/or AOCs releasing hazardous constituents to soil or ground water or by SWMUs in direct contact with these surface waters. The very low elevation of the land surface and the shallow water table of the surficial aquifer at MCRD would likely cause surficial aquifer water to discharge into nearby surface waters. The migration of any contaminants in the surficial aquifer would be facilitated by water table fluctuations caused by tidal changes, which would induce a flushing action that would accelerate both the dispersal of surficial aquifer contamination and discharge into the surface waters.

A 1992 study (Reference No. 4) of maximum chemical tissue concentrations for five (5) species of marine life in surface waters surrounding the Causeway Landfill (SWMU No. 3) did not document a public health risk associated with the consumption of seafood caught at this site. No data available to date indicates the existence of surface water contamination at MCRD. It should be kept in mind, however, that such contamination could be present. If contamination does exist, tidal flushing and dilution could make the contamination ephemeral in nature.

Because contamination has not been documented to have occurred in MCRD surface waters, there are at this time no known plausible human exposures which must be controlled due to contamination entering such waters.

Soil

Releases from SWMUs and/or AOCs have not been documented to have occurred above relevant action levels, despite the facility's past history of storing and disposing of wastes on bare soil. It is possible that contaminants have been washed away in surface runoff. It is also possible that an in-depth soil sampling program will detect contamination in soils at MCRD. The resolution of this question awaits the environmental investigation proposed in the Master Work Plan for MCRD.

Because contamination has not as yet been documented to have occurred in MCRD soils, there are at present no known plausible human exposures which must be controlled due to

contamination in the soils.

Air

Releases to air, either from operations at units or from soil, groundwater or surface water contamination, are not known to have occurred at concentrations above relevant action levels. Therefore, there appear to be no plausible human exposures to contamination via an air route, and no control measures are necessary.